

positioning of subscriber stations with an accuracy which is sufficient for most applications. One option for making available additional information is represented by the evaluation of the signal strengths of signals received from a subscriber station. As a rule, the signal strengths of receive signals are used by the transmitting station, which provides coverage for a radio cell in which the subscriber station is located and by additional radio cells adjacent to the transmitting stations. For example, in GSM systems (GSM: Global System for Mobile Communications) each active mobile station reports every 480 ms about the signal strength of receive signals of the base station covering them and about the signal strengths of additional receive signals of up to six adjacent base stations. These reports are compared with a signal strength database in order in this way to estimate the most likely location of the subscriber station in combination with the cell identification, if required.

Such methods and systems are for example known from the international patent application WO 98/15149.

Previously known methods for estimating the position of subscriber stations produce good results for estimating the position especially if a plurality of reports of a subscriber station about signal strengths of receive signals is used at the same time for estimating the position. However, in a GSM system for example, when for example 10 reports about the signal strengths of receive signals are used, there is an additional delay of approximately five seconds when determining the positions of a subscriber station.

From DE 100 56 22 A1, a method is known for localizing the traffic in a cellular mobile telephony network, in which from the transition probabilities of a hidden Markov model and the

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observation probabilities of an interference model from a sequence of reports, a highly probable path of a mobile subscriber can be determined. The reports contain the field strength values of base stations measured by the mobile subscriber. The reports are either sent directly to an arithmetic unit by the mobile subscriber or first collected by a base station and, if required, supplemented by additional measured values and sent in the form of one complete message to the arithmetic unit.

The object of the invention consists of improving the estimation of the position with regard to the processing speed.

This object of the invention is achieved according to the method and the network device in accordance with the independent claims.

Claims

1. Method for estimating the position of a subscriber station (MS) of a radio communication system, in which
  - a receive station (BS1) receives reports (B1, B2, ..., B10) from the subscriber station (MS), said reports containing information relating to the signal strength of a base signal (S1, S2, S3, S4) of at least one transmitting station (BS1, BS2, BS3, BS4) in the locality of the subscriber station (MS),
  - the reports (B1, B2, ..., B10) are stored in a memory (SP) of a network device (BS1) of the radio communication system and
  - a position determining unit (SMLC) takes into account at least two reports (B1, B2, ..., B10) stored prior to the request (AUF) for position estimation, in order to estimate the position of the subscriber station (MS).
2. Method according to claim 1, in which the receive station is used as the network device.
3. Method according to one of the preceding claims, in which the reports (B1, B2, ..., B10) during an active connection are received and/or stored regularly at specific time intervals in an idle mode of the subscriber station (MS).
4. Method according to one of the preceding claims, in which a maximum first number of reports (B1, B2, ..., B10) is stored in the memory (SP).
5. Method according to one of the preceding claims, in which the position determining unit (SMLC) requests a second number of reports (B1, B2, ..., B10) from the network device (BS1).
6. Method according to claim 5, in which the network device

(BS1)

- at the point in time (t1) of the request has stored a smaller number of reports (B1, B2, B3, B4) than the second number of reports (B1, B2, ..., B10),
- stores additional reports (B5, ..., B10; B5, ..., B8) until the second number of reports (B1, B2, ..., B10) has been stored or until a maximum period of time ( $t_{max}$ ) has expired and
- sends either prior to the expiry of the maximum period of time ( $t_{max}$ ) the second number of reports (B1, B2, ..., B10) or after the expiry of the maximum period of time ( $t_{max}$ ), the number of reports (B1, B2, ..., B8) stored up to that time to the position determining unit (SMLC), even if the number of stored reports (B1, B2, ..., B8) remains smaller than the second number of reports (B1, B2, ..., B10).

7. Method according to one of the preceding claims, in which the position determining unit (SMLC), carries out a position estimation by comparing the signal strengths which can be taken from the reports (B1, B2, ..., B10) with a signal strength database.

8. Method according to one of the preceding claims, in which the transmitting power is in addition given in the reports (B1, B2, ..., B10) by means of which at least one transmitting station (BS1) has sent the receive signal (S1) in each case.

9. Method according to one of the preceding claims, in which the reports (B1, B2, ..., B10) are in each case supplemented by the transmitting power of the subscriber station (MS) and the corresponding receive power at the receiver station (BS1) receiving the reports (B1, B2, ..., B10) in each case.

10. Network device (BS1) for a radio communication system,  
- with a memory (SP) for storing the reports

(B1, B2, ..., B10), which a receiver station (BS1) has received from a subscriber station (MS), in which the reports (B1, B2, ..., B10) in each case contain information relating to the signal strength of a receive signal (S1, S2, S3, S4) of at least one transmitting station (BS1, BS2, BS3, BS4) in the locality of the subscriber station (MS).

- with means (SE) for the transmission of at least two reports (B1, B2, ..., B10) stored prior to the request (AUF) for position estimation, to a position determining unit (SMLC), in which the position determining unit (SMLC) takes into account at least two stored reports (B1, B2, ..., B10) in order to estimate the position of the subscriber station (MS),

characterized by,

means for controlling the network device so that at least two reports are stored prior to the request (AUF) for position estimation.